MLCPAC STANDARD SPECIFICATION 085.1
GENERAL REQUIREMENTS FOR DRAWING PREPARATION

1 GENERAL

1.1 This specification establishes requirements for the uniform preparation of working drawings and "as-built" drawings using various referenced standards. Drawing preparation may include revision of existing drawings and complete drafting of new drawings (including completely new drawings that didn't previously exist and new drawings that are redrawn from existing drawings).

2. REFERENCES

Coast Guard Drawings: None

Enclosed Figures: None

Applicable Documents:

ANSI Y1.1; Abbreviations for Use on Drawings and in Text
ANSI Y14.1; Drawing Sheet Size and Format
ANSI Y14.15.a; Interconnection Diagrams
ANSI Y14.15; Electrical and Electronic Diagrams
ANSI Y14.17; Fluid Power Diagrams
ANSI Y14.2; Line Conventions and Lettering
ANSI Y14.3; Multi and Sectional View Drawings
ANSI Y14.5; Dimensioning and Tolerancing
ANSI Y32.10; Graphic Symbols for Fluid Power Diagrams
ANSI Y32.2; Graphic Symbols for Electrical and Electronics Diagrams
ANSI Z32.2.4; Graphic Symbols for Heating, Ventilating and Air Conditioning.
ANSI/AWS A2.4; Symbols for Welding and Nondestructive Testing
COMDINST M9085.1; Computer Aided Drafting Standards (Aug 90)
CG Tech Pub 1976; Computer Operated Engineering Data (COED) User's Guide (Feb 92)
DOD H4-1; Cataloging Handbook - Federal Supply Code for Manufacturers, Name to Code
DOD H4-2; Cataloging Handbook - Federal Supply Code for Manufacturers, Code to Name
DOD-STD-100D; Engineering Drawing Practices
G-ENE-5C Memo 9020 of 8 August 1990; Documentation of G-ENE
Standardized Drawing Borders and Drawing Title Blocks (with disk)
MIL-D-23140D; Drawings, Installation Control for Shipboard Electronics Equipment
MIL-D-5480F; Data, Engineering and Technical, Reproduction Requirements for
MIL-STD-12D; Abbreviations for use on Drawings, Specifications, Standards and Technical Documents
MIL-STD-22D, Notice 3; Welded Joint Design
MIL-STD-25B; Ship Structural Symbols for Use on Ship Drawings
MIL-T-31000, Notice 2; Technical Data Packages, Specifications For (Replaces DOD-D-1000-Drawings, Engineering and Associated Lists)
Naval Ship's Technical Manual, Chapter 997; Drydocking
NAVSEA Drawing No. 53711-803-5001049; Piping System Symbols and Abbreviations
NAVSEA Publication S0300-AT-GTP-010/ESL; Standard Electrical Symbol List
NAVSEA Std Dwg S9AAO-AB-GOS-010; General Specifications for Overhaul of Surface Ships

3 REQUIREMENTS

3.1 TYPES OF DRAWING PREPARATION - The Coast Guard will provide the Contractor direction in the tasking document. Generally, tasks will fall into the following categories:

3.1.1 New Drawings. All new drawings shall be prepared in CAD format, in accordance with COMDINST M9085.1. The following additions/exemptions to COMDINST M9085.1 are made:

3.1.1.1 Drawings shall be prepared in AutoCAD Version 12 vice any earlier version.

3.1.1.2 Paragraph 3.2.1 of this standard specification shall govern drawing sheet size.

3.1.1.3 Drawings prepared by Contractors shall use the example title block Figure 3-11 of COMDINST M9085.1 to develop their title blocks for use on USCG drawings. G-ENE-5C Memo 9020 with a disk will be provided upon request.

3.1.1.4 Single drawings associated with a single cutter may be hand drawn if specifically authorized by the tasking document.

3.1.2 Revisions to Existing Drawings. In most cases, "Revision of drawings" will be completed on U.S. Coast Guard supplied master mylar drawings, tracings, or sepias. In cases where drawings exist in CAD format, an AutoCAD file will be provided and "revision" shall be completed in accordance with COMDINST M9085.1, with further guidance provided by this standard specification.

3.1.2.1 Standard Revision Practices. The following standard drawing revision practices shall be observed. These practices are generally in accordance with MIL-T-31000 Technical Data Packages, General Specifications (supersedes DOD-D-1000) and MIL-STD-100. Additional information may be found in those documents or commercially prepared compilations of those documents for industry use. Graphite pencils shall not be used to revise or correct an inked or photographically reproduced drawing on polyester film. Plastic pencils of the type designed for use on polyester film, or similar film base drafting material, may be used for making revisions on the film, providing the microfilm image of the revised drawing meets the quality assurance provisions of MIL-M-9868/1. Revisions made to selected record drawings shall be in black drawing ink.

3.1.2.1.1 Revise Master Drawings Only. Revising a reproducible copy results in the generation of a duplicate drawing and often leads to confusion. Master Drawings will be stamped in red ink with the following note: THIS DRAWING IS THE MASTER DRAWING ONLY IF THIS NOTE IS IN RED INK (not all master drawings in the Coast Guard's files have been stamped yet). If this stamp is not in red ink, or if a stamp is present saying "FILE COPY", or "MLCPAC COPY", do not revise without specific direction from MLCP. A DRAFT revision to a drawing may be prepared on a reproducible copy (or on a print copy) only if that copy's title block is hatch-marked out and a large-lettered flag stating: "UNOFFICIAL DRAWING: FOR DRAFT REVISION PURPOSES ONLY" is prominently displayed immediately adjacent to the hatched-out title block.

3.1.2.1.2 Retain Historical Data. Revisions shall be prepared so as to retain as much of the previously-shown data as possible. Ideally, it should be possible to reconstruct the previous version of the drawing simply by undoing the changes described in the revision column. Thus the revision column itself should detail every change made, using wording that describes the change as accurately as possible, such as "ADDED DETAIL 9-F", "DELETED REF 16", or "RV-7 SET PRESS WAS 60 PSI". Note in the last case that it would be redundant to say "CHANGED RV-7 SET PRESS FROM 60 TO 75 PSI", because the body of the drawing already shows the set pressure as 75 psi. Data should be hatched-out (not erased, unless the revision column will document the previous data) and redrawn in another place. It is important to retain the previously-shown data because it may be years before a ShipAlt is actually accomplished aboard a cutter, and the operators and maintenance commands must have information that depicts their actual shipboard configuration in the meantime.

3.1.2.1.3 Give Reason for Revision. The revision column should begin by documenting the reason for the revision, such as "TO SUIT SHIPALT (number if known) TO REPLACE BEARING MATERIAL."

3.1.2.1.4 Add Additional Sheets. An effective way to revise a drawing is to add one (or more) new sheets. This approach is especially effective when large portions of a drawing must be redrawn. The old portions are simply hatched out, and the new sheet(s) can then be drawn in AutoCAD. This approach also retains the old data for historical purposes.

3.1.2.1.5 Show Revision Status.

3.1.2.1.5.1 On drawings that consist of more than one sheet, it is common practice for each sheet to carry its own revision designator, i.e. all sheets of the drawing do not necessarily carry the same revision, so that only the affected sheets need to be issued when revised. Sheet 1 always carries the last revision letter, while each remaining sheet carries the revision letter associated with the last revision that happened to affect that particular sheet. The revision letter on any sheet (except sheet 1) can therefore skip letters, such as from D to G.

3.1.2.1.5.2 Accordingly, the first sheet of a multisheet drawing shall have a Revision Status Table, which shall indicate the revision letter of each sheet of the drawing. A Revision Status Table shall be added if needed to all multi-sheet drawings whenever the drawing is revised for other reasons. With each revision to any part of the drawing, the revision status of sheet 1 shall be updated to the next sequential letter. Likewise, the revision letter of each affected sheet shall be updated to the same letter as sheet 1, and finally the Revision Status Table shall be updated. The revision letter of unaffected sheets shall not be changed.

3.1.2.1.5.3 The revision designator for a drawing shall be identified by an upper case letter or letters. The first revision shall be identified by "A", the second revision by "B", and so forth. Successive changes shall use the next sequential letter, except that the letters "I", "O", "Q", "S", "X", and "Z" shall not be used. Upon exhaustion of the alphabet, the next sequential revisions shall be "AA", "AB", etc., and then "BA", "BB", etc.

3.1.2.1.5.4 Where numbers have been used instead of letters for revision designators, the use of numbers shall be continued.

3.1.2.1.6 Make Revision Block:

3.1.2.1.6.1 All revision notes for a multi-sheet drawing shall be placed in one revision block or column, beginning on Sheet 1 and continuing to other sheet(s) as needed for space. In addition to revision details, the revision note shall identify the sheet number and applicable panel. However, if existing revisions to a drawing have been noted on the individual sheets, that practice may continue as long as a bold print note on Sheet 1 identifies that "REVISION NOTES ARE DETAILED ON INDIVIDUAL SHEETS". This latter practice shall not be used for revisions to new or previously-unrevised drawings.

3.1.2.1.6.2 A triangular revision symbol or identifier shall be placed adjacent to all revised areas, except where the entire sheet has been added by revision. The triangular symbol shall contain the appropriate revision letter. Where multiple items are being revised under the same revision, each item or group of items shall be identified with a superscript number outside the revision symbol that relates to the revision notes in the revision block.

3.1.2.2 Multi-Cutter Drawing Applicability - Drawings applicable to more than a single cutter may be revised only if changes made do not result in the loss of information describing other cutters. Drawings may include alternative details applicable to different cutters if the applicability is clearly indicated and no alternative detail applicable to any other cutter is erased or crossed out.

3.1.2.3 Revise, Supersede, or Create New Drawing

3.1.2.3.1 REVISE if extent of drawing changes are minor and the old data can be easily retained as explained in paragraph 3.1.2.1.2. Adding additional sheets to a drawing (see 3.1.2.1.4) applies here.

3.1.2.3.2 SUPERSEDE an existing drawing if extensive revisions are required, if the quality of the existing Master Drawing is poor (torn, faded, smeared, etc.), or if conversion (digitalization) of the drawing to AutoCAD is in order. The following steps shall be followed:

3.1.2.3.2.1 The (old) superseded Master Drawing shall have its title block hatched out, and a bold flag near the title block shall state: THIS DRAWING IS SUPERSEDED BY USCG DWG(S) XYZ. Increase this drawing's revision letter by one letter.

3.1.2.3.2.2 The (new) superseding Master Drawing shall carry a new USCG drawing number as assigned by Commandant (G-ENE-3). The superseded drawing title, approval names (text format) and approval dates shall be carried over to the new drawing. The new drawing shall be a "clean" drawing; i.e. revision symbols, cross-

outs, and the revision block from the old superseded drawing shall not be reconstructed on the new superseding drawing. The following bold face note shall be placed immediately adjacent to the title block: THIS DRAWING SUPERSEDES USCG DWG XXX. The original issue of this drawing shall be REV A, and the revision column shall begin as follows: THIS DRAWING WAS CREATED BECAUSE (give reason). If redrawn with substantive change from what was shown on the superseded drawing, describe the change and the reason for the change in the revision column as per normal revision practices. The revision approval date shall be the current date.

3.1.2.3.2.3 If the superseding drawing is a re-draw of a vendor-furnished drawing, retain as much of the original title block as possible, including the vendor's original drawing number, all rights legends and any corporate information. Revisions by the vendor shall be kept separate from revisions by the Coast Guard.

3.1.2.3.3 CREATE A NEW DRAWING with a new USCG drawing number if the data to be presented involves an entirely new system, new equipment or cannot otherwise be appropriately integrated (by revision or by being superseded) into the existing drawing set. For drawings applicable to an entire class, add the note "This is a Class Drawing developed from a shipcheck of _____<name cutter>. Intended applicability to other cutters must be verified."

3.1.2.4 Cancellation of Drawings. If a drawing no longer contains any currently useful or applicable information, such as an entire system being removed from a cutter, the Coast Guard may authorize cancellation of the drawing. Hatch mark out the title block and place the following bold face note immediately adjacent to the title block: THIS DRAWING HAS BEEN CANCELLED. Increase the revision letter by one letter, and give the reason for the drawing cancellation in the revision column.

3.1.2.5 Revisions When Master Drawing is Unavailable. This situation arises for example when Master rawings have not yet been received from the shipbuilder, and changes need to be made to certain systems.

3.1.2.5.1 A single, new Master Drawing for each appropriate set of drawings shall be created for the purpose of documenting needed changes. This new Master Drawing will be available for depicting various needed changes until the complete Master Drawings are received from the shipyard.

3.1.2.5.2 The title of this new Master Drawing shall be "CHANGES TO VARIOUS DRAWINGS", and the following note shall be displayed prominently on it's face: "THIS DRAWING WAS CREATED FOR THE PURPOSE OF DOCUMENTING CHANGES TO VARIOUS SYSTEMS AND EQUIPMENT WHICH WERE DETERMINED TO BE NECESSARY WHEN THE ORIGINAL MASTER DRAWINGS WERE NOT AVAILABLE FOR REVISION." The USCG drawing number forbthis new Master Tracing shall be (Cutter Class Number) WXXX 085-100.

3.1.2.5.3 This new Master Drawing (which may grow to many sheets) shall be used to depict changes to any and all systems and equipment regardless of the SWBS grouping of the system or equipment being changed. he drawing will serve as a single "place" where all such needed changes can be documented.

3.1.2.5.4 This Master Drawing shall be used to depict the needed changes in the most practical manner, by recreating only as much of the (absent) system drawing as necessary to understand the modification(s) that is to be made.

3.1.2.5.5 It is mandatory that this new Master Drawing make reference (by drawing number in a List of References on Sheet 1) to the (absent) system drawing. The List of References will be used as a "tickler" to update the absent Master Drawings when received. In addition, a note shall state: "This change was developed based on information shown at Revision "X" of reference (Y)."

3.1.2.5.6 When the (previously-absent) Master Drawings become available, it will only be necessary to pull the affected drawings and revise them as follows: Place the following note immediately adjacent to the title block: "FOR CERTAIN REVISIONS TO THIS DRAWING, SEE USCG DWG WXXX 085- 100." If time permits and it is feasible, the changes can actually be incorporated by revision, in which case the related portions of WXXX 085-100 should be hatched out to minimize confusion.

3.2 GENERAL DRAWING PRACTICES:

3.2.1 Drawing Sheet Size - Drawing sheet sizes shall be Size "A", "B", "C", "D", and roll type "H" as indicated in Table 1 which is extracted from ANSI Y14.1.

Table 1

STANDARD DRAWING SHEET SIZES

SIZE DESIGNATION	WIDTH (in.) (VERTICAL)	LENGTH (in.) (HORIZONTAL)	MARGIN(in.)* (HORIZ.)	(VERT.)
A	11.0	8.5	0.25	0.38
B	11.0	17.0	0.38	0.62
C	17.0	22.0	0.75	0.50
D	22.0	34.0	0.50	1.00
H	28.0	44.0(min)/88.0(max)	0.50	0.50

*Not including added protective margins (See paragraph. 3.2.3.2)

3.2.1.1 Roll type "H" drawings (28-inch high) shall have a maximum length of 88-inches (2 Microfilm Frame Segments). Specific Lines Drawings, (Ships) and Booklet of Plans, which cannot meet this requirement shall have a maximum length of 132-inches (3 Microfilm Frame Segments).

3.2.1.2 All existing drawings, including those that are to be renumbered and resubmitted, are exempt from the length requirements, except for existing Roll Type "G" (11-inches high). Material on these drawings shall be redrawn in conformance with the new specified drawing requirements.

3.2.2 Prints of Drawing and Reproduction. Prints of drawings shall be folded to a size of 11-inches vertical by 8-inches horizontal, with the title block exposed in the lower right-hand corner, unless otherwise directed. Reproduction shall be in accordance with MIL-D-5480. Xerographic reproduction that follows the general guidance of MIL-D-5480 is permitted.

3.2.3 Drawing Sheet Formats. For CAD, a floppy disk of standard formats, borders, and title blocks will be provided along with G-ENE-5C Memo 9020. In the preparation of formats, especially as reproducible format masters, the following guidance shall be utilized.

3.2.3.1 Title Blocks. A Standard Coast Guard Title Block shall be used within plan borders at the lower right hand side of drawing. The first sheet title block shall include the Contractor's Name, Address, and the contract number for the task, as well as a signature block. Unless otherwise directed, first sheet title blocks shall follow Figure 1. The first line of the Coast Guard approvals shall be labeled "Supervisor, Technical Services", the second line "Type Desk Officer", and the third line "Chief, Type Support Branch". The final approval shall be "Chief, MLCP(v)". The Revision block shall be located at the upper right corner. See G-ENE-5C Memo 9020 for examples of other title blocks and revision blocks.

3.2.3.2 Margins. The margin sizes indicated in Table 1 have been selected to permit reproduction of drawings. Protective extra margins of 4-inches on the leading (title) end and 2-inches on the trailing end shall be provided for protection in handling and storage. Similar margins shall be added to size "C" and "D" title or top sheets. Size "A" and "B" formats shall not have protective margins.

3.2.3.3 Zoning. Except for Size "A" and "B" formats, all Coast Guard drawings shall include zones for reference purposes. Where used, zones are indicated by alphabetical (vertical zones) and numerical (horizontal zones) entries in the format margins.

3.2.3.4 Line Conventions & Lettering. Line conventions and lettering shall be in accordance with ANSI Y14.2. Minimum letter heights for drawings shall be in accordance with Table 2. For CAD drawings, COMDTINST M9085.1 shall govern.

TABLE 2
MINIMUM LETTER HEIGHTS FOR DRAWINGS
(Extracted from ANSI Y14.2)

USEFREEHAND (in.)	MECHANICAL (in.)	DRAWING SIZE
Drawing Number in Title Block	5/16 (.312)	.290 Larger than "C"
Drawing Number in Title Block	1/4 (.250)	.240 "C" or smaller
Drawing Title	1/4 (.250)	.240 All
Section and Tabulation Letters	1/4 (.250)	.240 All
Zone Letters and Numerals 3/16 in Borders	(.188)	.175 All
Dimensions, Tolerances, Limits, Notes, Subtitles for Special Views, Tables, Revisions, and General Lettering for the Body of the Drawing	5/32** (.156)	.120* .140 "C" or smaller
		Larger than "C"

*For typewritten or computer generated lettering, .120" lettering is permitted; otherwise .140" lettering shall be the minimum letter height permitted.

** In variance with ANSI Y14.2.

3.2.4 Multi- and Sectional View Drawings. Multi and sectional view drawings shall be in accordance with ANSI Y14.3.

3.2.5 Dimensioning & Tolerancing. Dimensioning and tolerancing of Coast Guard drawings shall be in accordance with ANSI Y14.5. Drawings shall utilize U.S. customary units (non-metric units) unless otherwise specified in the contract or tasking documentation (dual dimensioning shall not be utilized). Use of fractional or decimal dimensioning is left to the option of the contractor, but shall be consistent throughout the drawing, and shall comply with existing drawings. Both decimal and fractional dimensioning may be utilized on drawings which contain machining details (decimals) as well as structural/equipment/piping details (fractions).

3.2.6 Abbreviations. Abbreviations used on drawings shall conform to MIL-STD-12 and shall be used only where the limitation of space or conservation of significant drafting time dictate. When required, abbreviations not covered by either MIL-STD-12 or ANSI Y1.1 shall be explained by a note on the drawing.

3.2.7 Drawing Scale. Drawing scale(s), where utilized, shall be indicated using the architectural method (Example: 1/2" = 1'-0", 6" = 1'-0) in lieu of fractional method. To allow for overlaying and ease of interference control, drawings for the same ShipAlt shall, where feasible, be drawn to the same scale for drawings such as arrangements, foundations, ventilation, piping, etc. When directed, the distance off centerline, height (above or below reference deck) and frame number shall be provided for piping, ventilation ducts, etc., where interferences may be encountered.

3.2.8 Symbols. Hull, structural, and mechanical graphic symbols for use on all Coast Guard drawings shall be as follows:

3.2.8.1 Structural. Structural graphic symbols shall comply with MIL-STD-25.

3.2.8.2 Welding. Welding graphic symbols shall comply with MIL-STD-22 and ANSI/AWS A2.4. In case of conflict between these specifications, MIL-STD-22 shall take precedence.

3.2.8.3 Fluid Power. Fluid power graphic symbols for diagrammatic drawings shall comply with ANSI Y32.10.

3.2.8.4 Piping. Pipe fitting, valve and piping graphic symbols for diagrammatic drawings shall comply with NAVSEA Dwg 803-5001049, except for fluid power systems (See 3.2.8.3)

3.2.8.5 HVAC. Heating, ventilation and air conditioning graphic symbols for diagrammatic drawings shall comply with ANSI Z32.2.4.

3.2.8.6 Electrical & Electronic. Graphic symbols for schematic diagrams shall be in accordance with ANSI Y32.2. Symbol numbers, where used for standard electrical equipment, shall be in accordance with NAVSEA S0300-AT-GTP-010/ESL.

3.2.9 Working Drawing Supplemental Requirements. The Contractor shall follow the ships existing drawing format when modifying drawings. The following requirements, which closely follow DOD-STD-100 and NAVSEA General Specfications for Overhaul (GSO), will normally apply to all new drawings. When preparing a drawing, if the major portion is developed by reproducing an existing drawing, then upgrading is not required.

a. New or revised ship drawings shall be supported by engineering analysis to assure compliance with applicable requirements.

b. Stress diagrams. Unless otherwise specified, where stress diagrams are required, the diagram shall, incorporate the following data:

c. Working load, test load, assumptions as to manner of loading (live, dead, alternating), assumed friction, materials (including specification number), maximum stresses in each part (compressive, tensile, shearing, bearing, and torsional developed by the working load, and the factor of safety in each part.

d. Information regarding characteristics under dynamic loadings, where applicable shall include calculations for natural frequencies of vibration and for resistance to shock loadings, together with pertinent data.

e. Stress diagrams shall be submitted in a complete and rational form so that each step can be verified without difficulty. Pertinent work sheets such as for calculation of section modulus of an irregular sections, shall be submitted with the stress diagram. The format of these work sheets may be of any convenient form.

f. A complete list of material shall be integral with the drawing and at as a minimum approximate lengths, or quantities, unit weight and approximate total weight shall be entered.

g. All new and revised drawings shall be processed to achieve reproducibles which will meet the quality standards of Military Specifications, MIL-D-5480 and MIL-M-9868 as modified herein:

1) MIL-D-5480D, paragraph 3.21, modify to require clarity for second generation copies in lieu

of fourth generation

2) MIL-M-9868D, paragraph 38, after "From Class I Microfilm" delete "4" and substitute "1".

h. Interference control - Interference control drawings, overlay drawings or composite drawings, or computerized interference elimination systems may be used to assist in eliminating sources of shipboard physical interferences by coordinating access openings, arrangement of furniture equipment, stowage and fixtures, with the ventilation, piping, wiring, and other systems. The use of such methods shall not reduce or eliminate requirements for system drawings specified elsewhere herein.

3.2.9.1 Ship Equipment Drawings are drawings generally prepared by manufacturers of Government- or Contractor-furnished equipment. Contrary to Navy practice, these drawings are shall be assigned a Coast Guard Drawing number in addition to the equipment manufacturer's number. Unless otherwise specified, drawings shall be in sufficient detail to:

a. Assure equipment conforms to the SAR

b. Enable shipyards to install the equipment.

c. Enable Coast Guard shore and fleet activities to maintain and repair the equipment in conjunction with technical manuals.

3.2.9.2 Hull Drawings

Hull drawings shall include lists of reference drawings referring to all other related drawings. Each drawing should clearly identify all existing structure to which it attaches or modifies.

New drawings shall be prepared to the following scale:

Plans	Drawing Inches to the foot
	Decks, Profiles and General	1/4
	Midship section	1/2
	Docking plan	1/4 (cutter length under 200 ft)
		1/8 (cutter length 200 - 599 ft)

Scales for drawings not otherwise specified may be as selected by the Contractor and shall be suitable for proper interpretation and meet the legibility requirements of MIL-D-5480.

3.2.9.2.1 Docking Plans:

3.2.9.2.1.1 At each docking, the cutter shall be inspected for fit of docking blocks and location of shell openings. Any change to the cutter's hull below the full load water line which affects the docking drawing shall be reflected in a revision to the docking drawing. The revision shall be in accordance with NSTM Chapter 997. A revision statement shall be added to the drawing identifying the revision and stating the reason for the revision.

3.2.9.2.1.2 Where the deviation of the keel from the bottom of the keel midships extended exceeds 5/8 inch, a profile showing this deviation in such areas shall be included in the docking drawing. In addition, an arbitrary base line for determining corrections to draft readings for obtaining accurate displacements shall be shown as follows:

a. The arbitrary baseline shall be a straight line averaging the local irregularities if the keel is substantially straight, or a fair curve if the ship has a permanent hog or sag.

b. The docking drawing shall indicate corrections which are to be made to forward, aft, and midship observed draft mark readings to obtain correct displacements from curves of form.

c. The correction shall be entered as zero if it is less than 1/4 inch.

3.2.9.2.1.3 General information to be included on all docking drawings is as follows:

a. A plan view of the ship and the blocking arrangement.

b. A profile of the ship supported on the pier keel blocks.

c. Frame spacing of ship on profile view.

d. Sections, as required, to illustrate the transverse blocking arrangement, especially in cases where high blocking is required and stability in dock is a consideration.

e. Location of side blocks in all three docking positions.

f. Location of bitts and chocks on profile view.

g. Location of underwater appendages on both profile and plan views.

h. Indication of major transverse bulkhead on profile view.

i. Notes on the profile view in the vicinity of sonar domes, rudders, secondary propulsion units, and similar removable appendages, specifying the clearance below the bottom of the keel required for their removal.

j. Notes on the profile view indicating the clearance required beyond the stern reference point for removal of the shall or shafts.

k. Table of critical dimensions.

l. Table of displacements and other properties for docking.

m. Trim table for propeller clearances.

n. Table of block bearing areas and pressures.

o. A list of openings in the shell, together with locations.

p. Tables of offsets for side blocks and keel blocks, as required.

q. General notes: Any other information considered to be of aid in docking the ship.

3.2.9.2.2 Access study. Drawings shall list pieces of machinery and equipment to be handled through the indicated openings, giving the size and weight of each. Route of handling shall be shown and clearances for principle pieces of machinery and equipment indicated. Openings, such as hatches and doors, shall be shown. Details of special closure plates shall be shown. Ballistic plates which require removal shall be clearly indicated.

3.2.9.2.3 Outboard fittings. Plan views and profile shall show outboard fittings such as are listed in Table 3.

TABLE 3

OUTBOARD FITTINGS TO BE SHOWN ON PLAN & PROFILE VIEWS OF HULL DRAWINGS

Airports Masts Anchors Navigation Lights Antennas Propellers Awnings and side curtains Rails Bells Range finders Boats Rigging Booms Rudder Capstans Scuppers Chocks, warping and mooring Searchlight platforms Compasses Shafting, propulsion Cranes Ship control (exposed stations) Davits Sky lookouts Deck lines (profiles only) Smokestacks Directors Spars Fenders Sponsons stanchions (rail and awning) Fire control (exposed stations) Stowage, boats Fixed lights Struts Fueling stations Ventilators (indicate heights) Life saving gear Winches Lights Windows Ladders

3.2.9.3 Machinery Drawings:

3.2.9.3.1 New machinery and piping arrangements shall be drawn to scales of not less than 1/4 inch to the foot. Where practicable, machinery arrangements for the same class shall be drawn to the same scale. Diagrams, preliminary sketches, and other drawings which could be misinterpreted because of lack of scale may be drawn without a definite scale provided the concept is clear. Symbols, diagrams and designators for dimensioning and tolerances, fluid power components and diagrams, welding, surface texture, screw threads, gears, springs and all associated components on machinery drawings shall be in accordance with DOD-STD-100.

3.2.9.3.2 Machinery arrangement drawings shall show piping systems, ventilation ducts, adjacent mechanical and electrical equipment, and main wireways, as necessary to ensure against interference between any new and existing components

and to prevent undesirable conditions such as fluids from piping systems or moisture from ventilation ducts being directed on electric equipment, wireways, or lagged surfaces. Machinery arrangement drawings shall also show, as applicable, other pertinent features such as major machinery foundations, tube removal space outlines, unshipping of shafting, in-place overhaul clearances, space outlines required for accessibility or attached equipment removal during overhaul/maintenance, combustion air intake and exhaust systems, ladder landings and accesses, stanchions, overhead structure, bulkhead stiffeners, and other hull structure necessary to indicate machinery obstructions, large piping such as main injection and discharge piping, main sea connections and valves, location of removable plates or shipping and unshipping machinery, permanent lifting gear and trolley arrangements, and locations of firefighting equipment.

3.2.9.3.3 Drawings shall be prepared illustrating any new or revised lifting gear arrangements (portable or permanent installations). Drawings shall show lifting and moving arrangements for each part, weight of part to be moved, safe working capacity of lifting gear, and shall identify by separate part number the different slings and shackles. Lifting gear including slings and shackles may have multiple uses and need not be limited to single piece of equipment. Drawings shall show details of lifting gear and shall include such notes as may be necessary to describe parts. Drawings shall also show the method of testing the lifting gear, including padeyes and lifting lugs, which are permanently installed in the ship or which must be dismantled to be removed from the ship.

3.2.9.4 Electrical Drawings:

Drawings showing both runs of wiring and structural work shall have the wiring runs shown in thick lines and structural work (such as outlines of decks and bulkheads) in thin lines.

Power and lighting system drawings may be prepared as Book Form Drawings. The number of sheets per book should not exceed 250.

Symbols used on drawings to indicate type of appliances and fixtures shall comply with the Standard Electric Symbol List publication, NAVSEA S0300-AT-GTP-010/ESL.

Each drawing on which equipment, appliances, and fixtures are shown by a symbol shall have a legend which shall show, in parallel vertical columns, each symbol used and its name or descriptive identification. For power and lighting drawings, symbol numbers only may be used instead of drawing in the graphic symbols.

Wiring deck drawings shall be drawn to a scale in accordance with paragraph 3.2.9.2 of this specification.

Wiring deck drawings and general arrangement drawings showing electrical wiring shall also show major structures which may affect the run of electrical wireways. Doors, hatches, scuttles, manholes, patches, and removable plates shall be shown.

Wiring deck drawings shall show the location of equipment insofar as practicable. Cable ends to be sealed shall be indicated on power and lighting drawings.

Each system wiring drawing shall have a reference drawing table referring to all other drawings of the system. Each of the deck drawings showing electrical, wiring shall have a similar table of reference drawings.

Wiring diagrams shall contain material lists. Applicable cableway installation drawings shall be included in the list of references.

Elementary wiring diagrams may be prepared in the form of cabling diagrams and conductor connection tables. See paragraph 3.2.9.4.1 for Coast Guard unique requirements (COED) for conductor connection tables. Cabling drawings need not be to scale. Elementary wiring drawings shall show and identify the source of electric power, such as the distribution panel or switchbox.

Isometric drawings shall be drawn to a scale suitable for clarity. They shall show structural outline necessary to illustrate cable runs relative to the main compartmentation.

3.2.9.4.1 Computer Operated Engineering Data (COED). The elementary wiring data shall be prepared in the format of the Coast Guard Computer Operated Engineering Data (COED) User's Guide, dated 1 June 1976, publication number, TP #1976 as revised 22 Feb. 1982. This machine-prepared wiring list shall include, as a minimum, the following information:

Cable Number (designation)
Cable Type
Cable Length
Connector Type
Connector Pin Designation

3.2.9.5 Interior Communications (IC) and Weapons Control System Drawings

3.2.9.5.1 In general, these drawings shall be prepared using the same standards as Electrical Drawings.

3.2.9.5.2 The IC and Weapons Control System Equipment Arrangement drawings shall show structure, ventilation, rigging, and all other equipment and systems that may affect the equipment installation.

3.2.9.5.3 The scale to which these drawings are drawn will be one inch to the foot except for topside antenna arrangements which may be as small as 1/4 inch to the foot.

3.2.9.5.4 Overlay technique shall be used to assure all fouls and interferences are avoided when IC or Weapons control System spaces are reconfigured, receive multiple ShipAlts or are added to ship's structure.

3.2.9.5.5 Systems may be depicted on Elementary & Isometric Wiring Diagrams in block diagram form with compartment layout corresponding to the ship's general configuration.

3.2.9.5.6 Wires requiring shielding and grounding shall be designated. Individual wires shall be terminated to identified terminals within equipment. Distribution shall be indicated. Wire connections to be accomplished at terminal boxes may be represented by intersecting lines representing wires with a solid dot at the point of intersection in lieu of actual terminal box representation.

3.2.9.6 Selected Record Drawings. A large number of drawings have not, in practice, been maintained current. From a practical standpoint, there are many drawings that are needed for initial construction, but thereafter are not required to be kept up-to-date for the life of the cutter class. The time and effort required to keep ALL drawings up-to-date is not warranted.

3.2.9.6.1 Drawings Required to be Kept Current:

All standard boat drawings. (i.e. vessels less than 65 feet in length).
Booklet of General Plans (BGP). If a vessel's drawing set contains a Booklet of General Plans, and the same drawings (i.e. inboard profile) with separate drawing numbers, ONLY the Booklet of General Plans will be kept up to date.
Docking drawings.
Piping, ventilation and air conditioning diagrammatics, EXCEPT that any manufacturer make and model number data will not be updated
One-line electrical drawings.
Propulsion shafting arrangement drawings, including the table of bearing reactions and influence numbers, and the propeller drawings
Underwater body appendage drawings, such as Rudder and Stocks, Fin Stabilizers, Bow Thrusters, Sonar Dome Arrangements, Strut Bearings, etc.
Structural Drawings, including drawings (such as watertight hatch drawings) which depict features of watertight integrity; and mast arrangement drawings.
Shell Expansion drawing.

Weight handling system drawings, such as boat handling arrangement, boom/crane arrangement, rigging for integrated tow, spud/spud well, etc.
Navigation light arrangement and details.
Antenna arrangement drawings. (sometimes included as part of the outboard profile in the BGP)
Ordnance benchmark drawings
Tank capacity tables
Machinery arrangement drawings (normally included in the BGP)
Propulsion and electric plant control diagrams
Fueling-at-sea arrangement drawings
Draft Mark drawings
Compartment air testing diagram
Stability and Loading Data Booklet (SLDB), Inclining Experiment Report, and other stability-related documents.
All fleet drawings.
Visual ID (sometimes shown on the Outboard Profile in the BGP)
Curves of form
Steering gear arrangement
Interior communications (IC) block/elementary wiring diagram.
Flight deck marking drawings.

3.2.9.6.2 Requirements for SRD's - Selected Record Drawings shall be created & modified in accordance with this specification. If directed by the Coast Guard, the contractor shall add a general note (in boldface) to the drawing stating "THIS IS A DESIGNATED SELECTED RECORD DRAWING PER COMDTINST M9000 AND SHALL BE MAINTAINED CURRENT."

3.2.10 List of Materials. Parts and material lists shall be integral with drawings that require them and contain all material required to accomplish the work shown on the drawing. The following information, as a minimum, shall be provided as follows:

3.2.10.1 Piece Number. Piece numbers are assigned sequentially to each of the different items in the list, excluding electrical cables.

3.2.10.2 Quantity Required. The total quantity of each item for one ship shall be entered in the Quantity Required column. An effort shall be made to specify exact quantities, but in those where they cannot be derived, approximations shall be made and specified as such. Use of phrases such as "as required" shall not be used except for items such as cable clamps, paint, etc. If incidental items are covered by other drawings, those other drawings shall be referenced.

3.2.10.3 Description. A complete description (noun name and size) as described in the material specification (as applicable) shall be provided. For items such as structural shapes, the overall dimensions (width and height) shall be provided and shall be referenced to detail sketches of the drawing or shall be assigned assembly numbers and referenced to an assembly or detail drawing in the Part Number column.

3.2.10.4 Material Specification. The applicable military or other approved specification for each item of material being ordered by the drawing shall be entered in this column. Do not list the specification revision letter or date unless only a specific revision is applicable. Do not indicate an item in this column as being "COMMERCIAL" or identify an item by a proprietary or commercial name or trademark unless it is found that no standard specification is available. In such cases, the "REMARKS" column may be used to indicate "SIMILAR OR EQUAL TO _____".

3.2.10.5 Material Requirements - Applicable type, grade, class, condition or other classification, as applicable, is shown in this column when a specification or standard is referenced and the specification lists alternate choices. If necessary to fully describe the material required, the "REMARKS" column shall provide the additional data or a General Note shall be referenced which shall provide such information.3.2.10.6 NSN or Manufacturer's Stock Number - The National Stock Number (NSN) or manufacturer's part number for each

item shall be entered into this column. Maximum effort shall be exerted to utilize standard stock items and to minimize or preclude the use of one-of-a-kind or unsupportable items. Use of reference information such as HEDRS, FEDLOG, GSA-SourceOne, etc. to find supportable items is encouraged.

3.2.10.7 Source - The source of material shall be indicated on the drawing. Identify each of the material items by the use of one of the following symbols:

E - Existing item (not relocated)
R - Existing item relocated
M - Existing item modified (not relocated)
MR- Existing item modified and relocated
N - New Material

3.2.10.8 Allowance Parts List. The Allowance Parts List (APL) number for each item, as applicable, shall be provided in this column when a standard APL is available. Where no standard APL exists or the APL is to be prepared during the ship's availability, this requirement shall be omitted and the column space left blank for each applicable item.

3.2.10.9 Unit Weight. The operating weight, including required fluids (oil), water, etc., (not ordering weight) in pounds for one item shall be provided. For those items ordered in running feet, square feet, gallons, etc., the weight of one unit of measure shall be provided. For each individual modification drawing, provide the total weight change and the longitudinal, transverse, and vertical location of the center of gravity for material that was added, removed, or relocated, unless the tasking document specifically relaxes this requirement.

3.2.10.10 Remarks. Any clarifying statements shall be entered in this column.

3.2.10.11 Drawings implementing more than one ShipAlt/BoatAlt. For multi-ShipAlt drawings, a column titled "SHIPALT" shall be added to the left of the Part Number column. This column shall indicate the authority responsible for the purchase of each item of new material in the List of Material. Exception: Drawings utilizing many piece-parts common to more than one ShipAlt where separate identification of quantities is impractical (e.g., foundation drawings), may specify quantities for the group of ShipAlts.

3.2.11 Drawing Notes. Requirements shall be as follows:

3.2.11.1 General Notes. Notes which state the conditions under which a drawing was prepared and highlighting conditions, procedures or general information necessary for complete understanding of the work to be accomplished by the drawing.

3.2.11.2 Ripout Notes. Notes providing information on the removal and disposition of equipment, components and/or structures which must be removed from a ship prior to the installation of other equipment, components and/or structures. Ripout notes are normally placed after the General Notes on a drawing and sequentially numbered "R-1", "R-2", etc.

3.2.11.3 Special Notes. Examining or testing procedures or conditions which should be highlighted. Special notes are included as part of general, ripout or test notes which require special attention and are not normally listed separately. Special notes shall be short, concise and used only to emphasize important or critical data.

3.2.11.4 Test Notes. Notes, which state the testing criteria that must be carried out to certify the work, accomplished by a drawing. Test notes shall not take the place of, or reference specific test procedures, but may invoke test criteria established by other documents. Test notes are normally placed after the Ripout Notes on a drawing and sequentially number "T-1", "T-2", etc. On drawings not having Ripout Notes, Test Notes shall be placed after the General Notes.

3.2.11.5 Quality Control Notes. These notes may spell out requirements for manufacturer's laboratory test certificate or other quality control actions necessary to assure proper material or specified equipment will have been supplied.

3.2.11.6 Production Control Notes. Include any specific production problems that need special attention.

3.2.11.7 Safety Notes. List any special safety problems.

3.3 SHIPCHECKS & REDLINES. If required by the tasking document, the Contractor shall carefully "Shipcheck" his drawings against the actual installations onboard the ship. The Contractor shall correct all errors and omissions that occurred during original survey, those that occurred during preparation of the drawing, and those that evolved since the original survey. Upon request, the Contractor shall mark-up a blueline copy of the modified area of the system or the entire system to reflect the actual installation onboard the ship.

3.4 BUSINESS DETAILS:

3.4.1 Tasking. The Coast Guard will generally task the contractor with a "Technical Directive" or a "Statement of Work" which shall completely describe the task. Data Item Descriptions per MIL-T-31000 may also be part of the tasking. These work descriptions shall govern over any other document, including redline markups and this standard specification, in any dispute regarding the scope of drawing revisions.

3.4.2 Government Furnished Drawings:

3.4.2.1 Provision of. Blueprints of affected drawings or redline markups will be submitted with the initial tasking for estimating purposes. The contractor shall exercise all due care with mark-up copies while they are in his possession, as they are generally the only copies available. Coast Guard Originals, which are generally either CAD files or Mylars, but possibly ink on linen, vellum tracings, or sepias, will be provided once a job order is issued. In some cases, master drawings may be provided up to one week after work order award, in the event they have to be provided by Headquarters (i.e. Washington, D.C.). The Contractor shall acknowledge in writing receipt of original drawings. The accuracy of any reference plan furnished by the Government is not guaranteed. They are furnished to the Contractor solely to facilitate his work in preparation of the required drawings. The accuracy of the finished drawings is the responsibility of the Contractor.

3.4.2.2 Deficiencies with. In case of deficiencies with Government Furnished Information, a Condition Found Report shall be submitted. The deficiencies, problems and corrective actions shall be documented on the report.

3.4.3 Liaison. Any technical or format questions on Coast Guard drawings or requests for drawing numbers or titles shall be referred via the Contracting Officer's Technical Representative to MLC PACIFIC, Specifications Branch, Technical Section, Coast Guard Island, Alameda, Ca. 94501, Phone Number (510) 437-3261.

3.4.4 Drawing Submittal. Unless otherwise specified, The contractor will have 60 calendar days to complete revisions and/or prepare any new drawings for initial submittal. The Contractor shall conduct his own internal review of the revised drawings using a senior designer, senior draftsman, or engineer prior to submittal to the Coast Guard.

3.4.4.1 Initial Submittal. The Contractor shall deliver (one each) blue line "check print" or "new drawing prints", with the original "red line" drawings to Technical Section. To assure an orderly flow of work in large orders, small portions of the work order shall be submitted for Coast Guard Technical Section review, mark up, and comments as they are completed, no more than 10 sheets of drawings per week. The Coast Guard should complete its review and return the check prints within 21 calendar days from their receipt by the Coast Guard (returned in this context means mailed, or delivered to the Contractor's representative).

3.4.4.2 Design/Drawing Deviations. When working drawings are submitted for approval, the Contractor shall advise in writing of all drawing deviations, alterations or substitutions from the requirement of the specifications, the contract or the guidance drawings. Approval of a drawing (s) which contains deviations, alterations or substitutions, that were not pointed out by the Contractor, does not constitute approval of these deviations, alterations or substitutions. The Contracting Officer is the only one who may approve of "Deviations, Alterations, or Substitutions".

3.4.4.3 Contractor's Responsibility. The Coast Guard in its function of drawing approval does not assume responsibility as a design and drafting checker. The Contractor has the responsibility for providing an operable and satisfactory product, built in accordance with these specifications. The Coast Guard will not knowingly approve any working drawing that fails to meet contract requirements.

3.4.4.4 Final Submittal. The contractor shall make all final revisions, corrections, addition or deletion's upon receipt of "reviewed" blue line check prints within 14 calendar days of their receipt of the reviewed check print. If the initial review by the Coast Guard leads to substantial changes to the Preliminary submittal drawings, a second review may be conducted. The Contractor's final submittal shall include the following as appropriate:

All Coast Guard supplied original mylar (or sepia) "revised" drawings.
Any "new" mylar drawings.
Technical Section marked up blue line drawings, as provided contractor after "initial review".